

# Urinary System Anatomy

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# URINARY SYSTEM ORGANS

Kidneys (2)

Ureters (2)

Urinary bladder

Urethra

# KIDNEY ANATOMY

Protected by three connective tissue layers

- **Renal fascia**
  - Attaches to abdominal wall
- **Adipose capsule**
  - Fat cushioning kidney
- **Renal capsule**
  - Fibrous sac
  - Protects from trauma and infection

# KIDNEY ANATOMY

## Gross anatomy

- *Renal sinus*
- *Renal parenchyma*

# KIDNEY ANATOMY

## Renal sinus

- Surrounded by renal parenchyma
- Contains blood & lymph vessels, nerves, urine-collecting structures

# KIDNEY ANATOMY

## Renal parenchyma

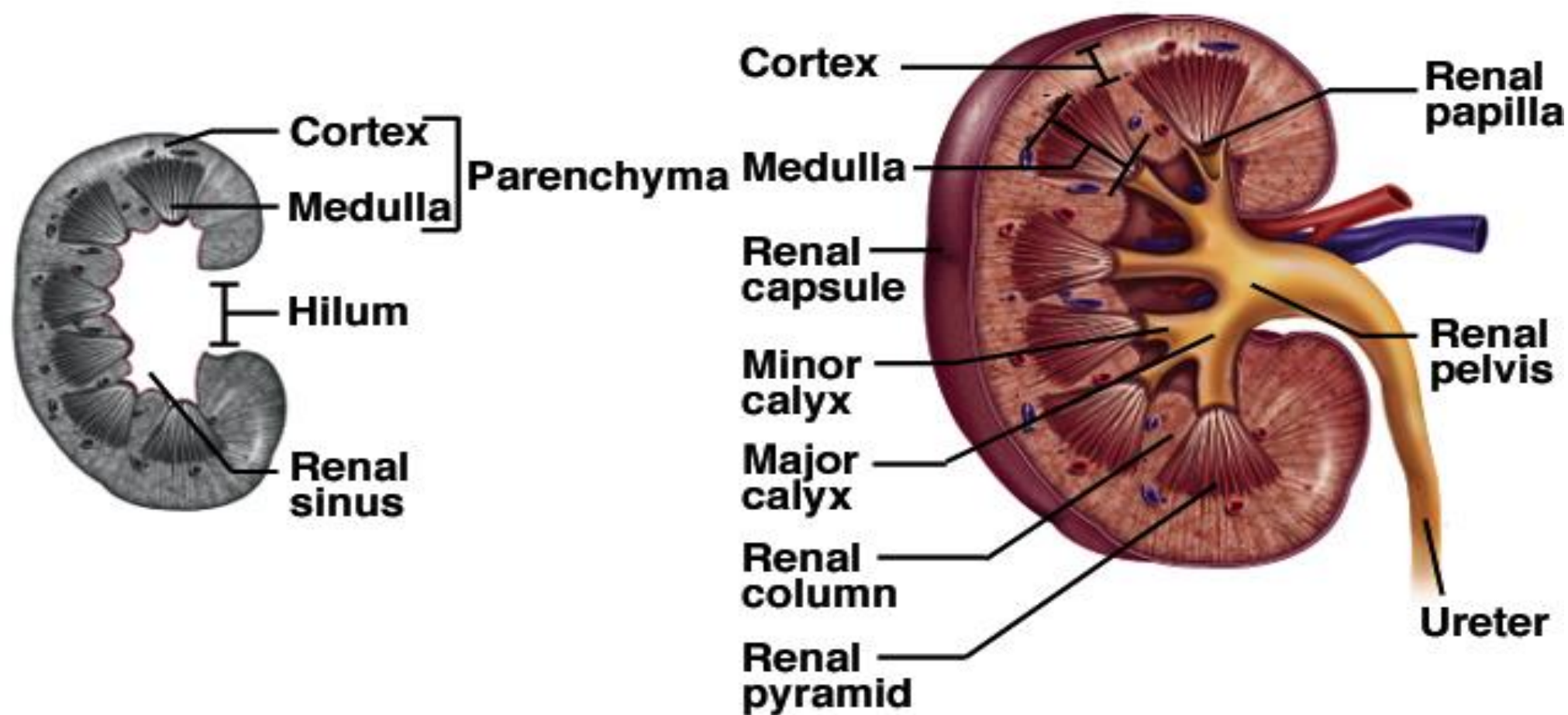
- Two zones
  - Outer cortex
  - Inner medulla

# KIDNEY ANATOMY

## Renal parenchyma

- **Renal pyramids**
  - Extensions of cortex (renal columns) divide medulla into 6 – 10 renal pyramids
  - Pyramid + overlying cortex = **Lobe**
  - Point of pyramid = **Papilla**
  - Papilla nested in cup (**minor calyx**)
  - 2 – 3 minor calices → **Major calyx**
  - 2 – 3 major calices → **Renal pelvis**
  - Renal pelvis → **Ureter**

# Anatomy of Kidney





# KIDNEY ANATOMY: NEPHRONS

## Nephrons

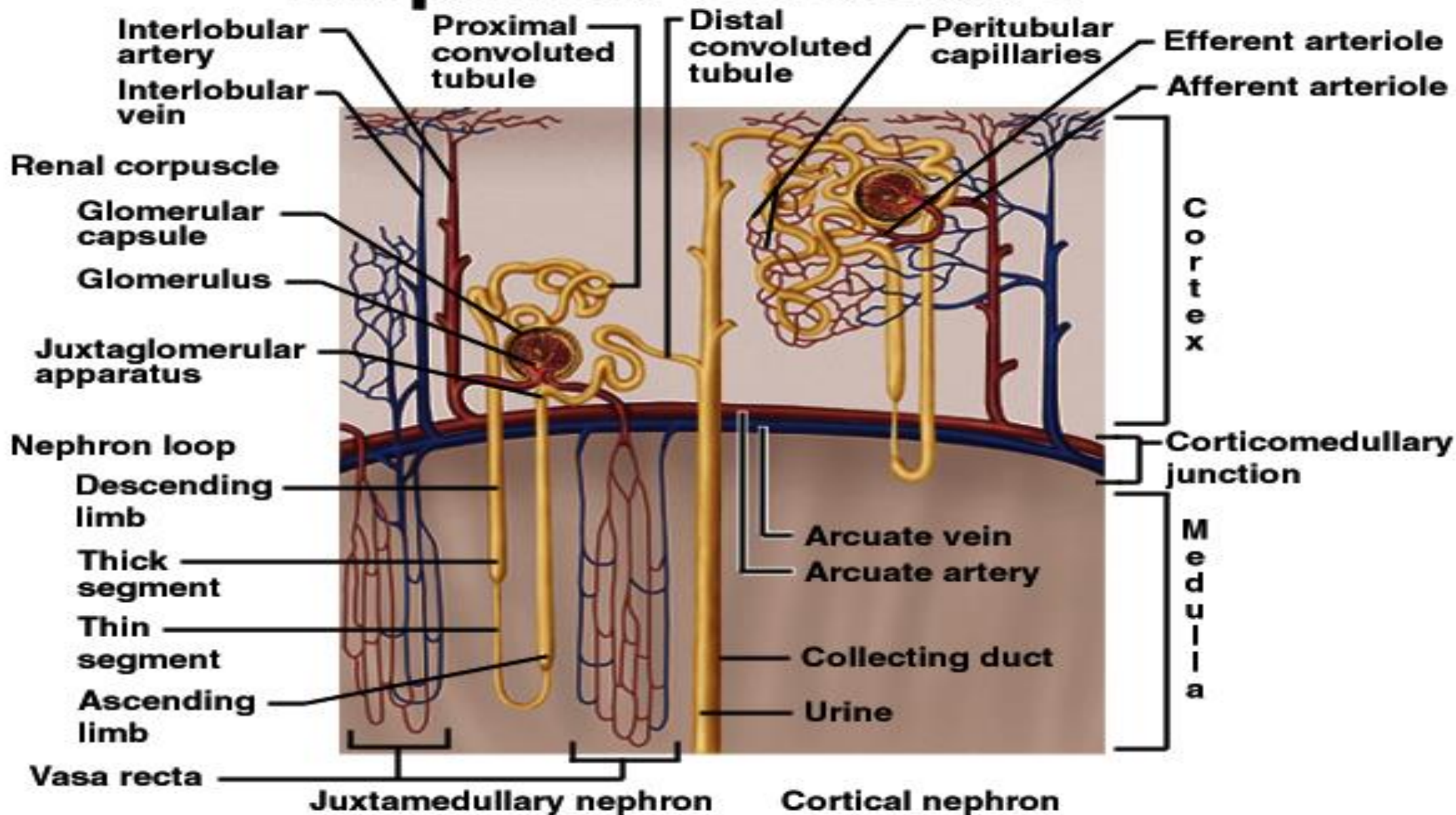
- Functional units of kidney
- Three main parts
  - Blood vessels
  - Renal corpuscle
  - Renal tubule

# NEPHRONS

## Blood vessels servicing kidney

- Supplied by Renal artery
  - → → Afferent arterioles
  - Drained by Efferent arteriole
  - → → → Renal vein

# Nephron Structure

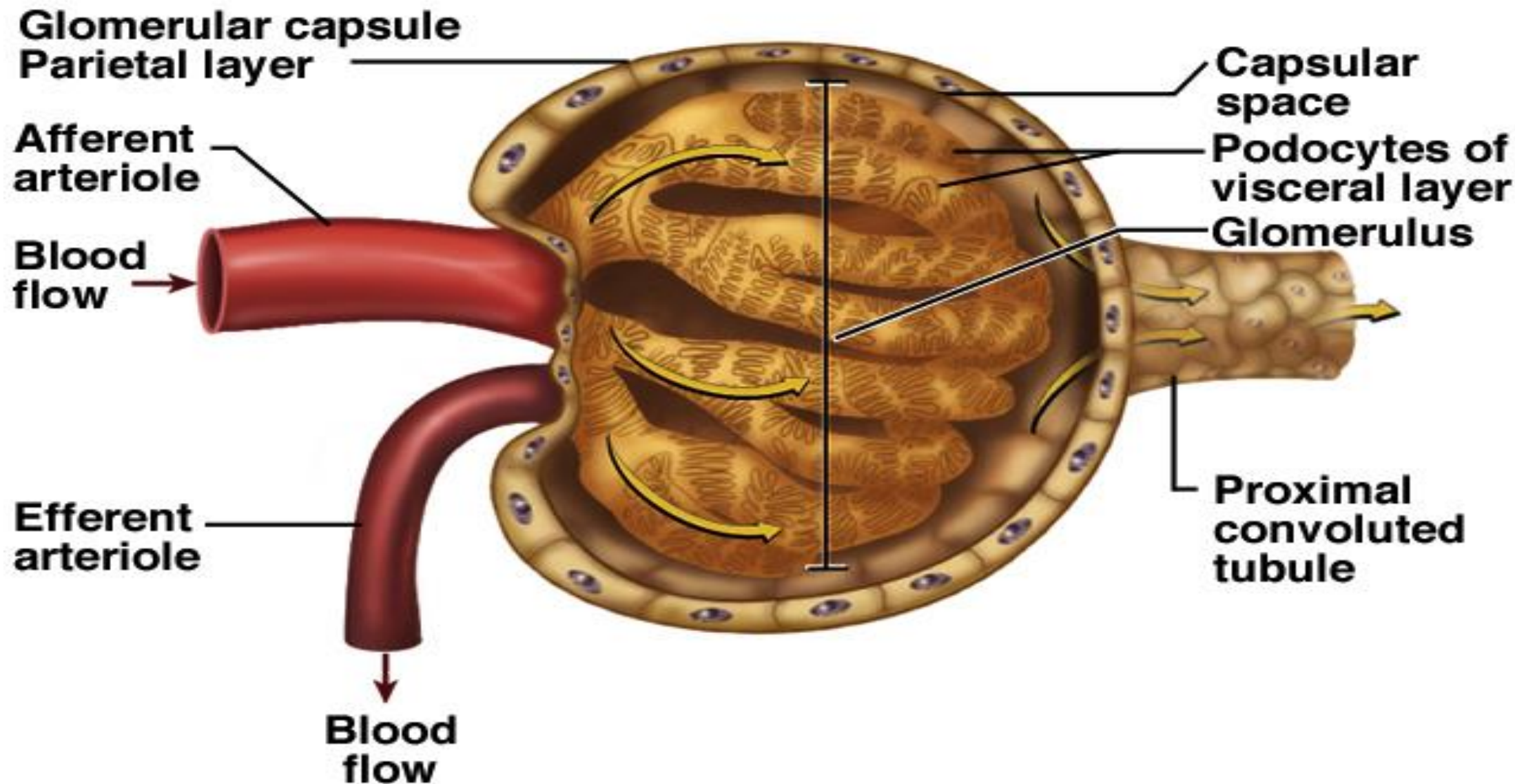


# NEPHRONS

## Renal corpuscle

- Glomerulus plus capsule
- Glomerulus enclosed in two-layered glomerular capsule
  - “Bowman’s capsule”
- Fluid collects in capsular space
- Fluid flows into renal tubule

# Renal Corpuscle



# NEPHRONS

## Renal tubule

- Leads from glomerular capsule
- Four major regions
  - Proximal convoluted tubule
  - Nephron loop
  - Distal convoluted tubule
  - Collecting duct



# URINE STORAGE

## Ureters

- Carry urine from kidneys to urinary bladder via peristalsis
- Enter bladder from below
- Pressure from full bladder compresses ureters and prevents backflow
- Small diameter
- Easily obstructed or injured by kidney stones (renal calculi)

# URINE STORAGE

## Urinary bladder

- Muscular sac
- Wrinkles termed rugae
- Openings of ureters common site for bladder infection



# URINE ELIMINATION

## Urethra

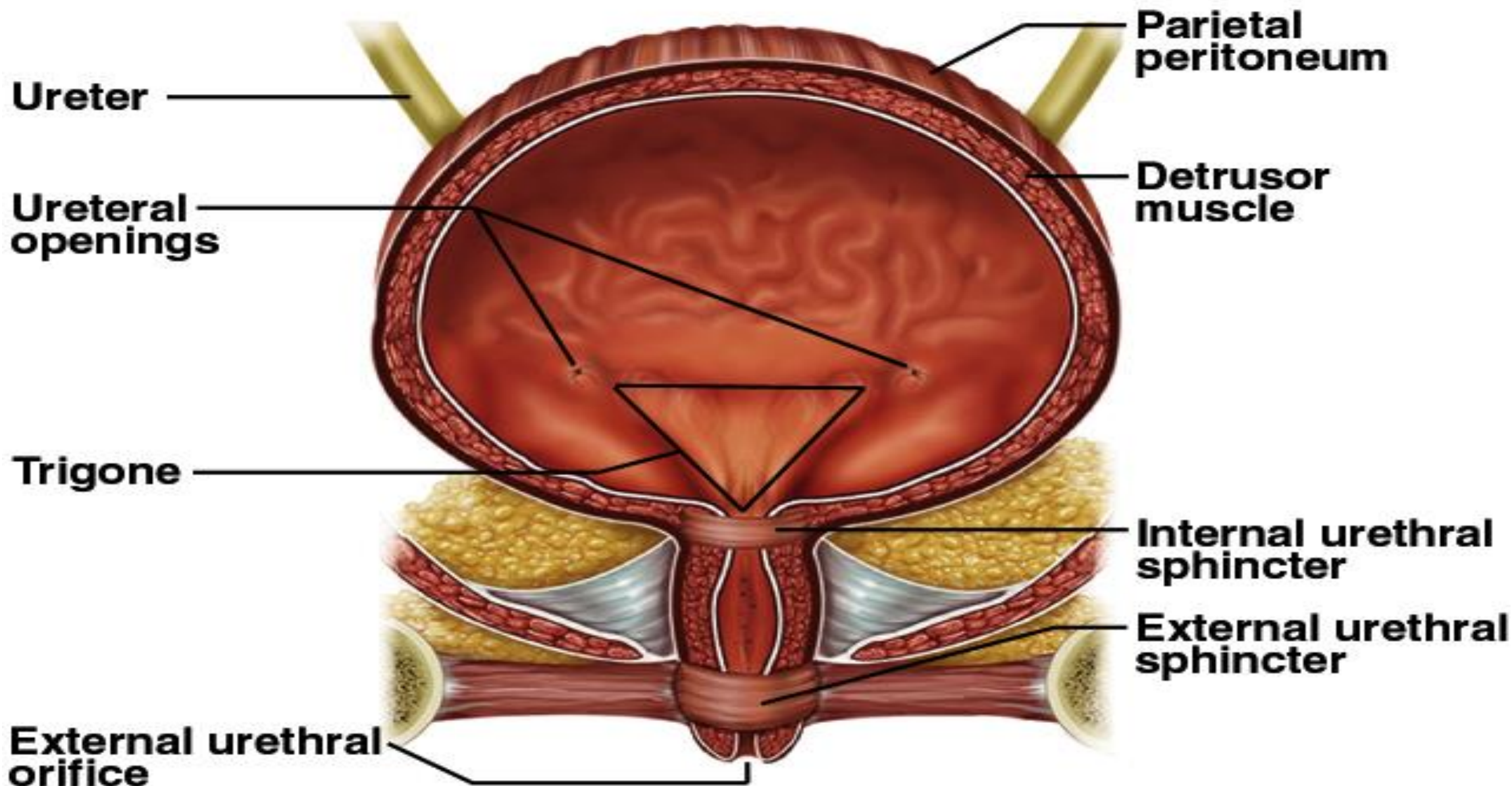
- Conveys urine from body
- Internal urethral sphincter
  - Retains urine in bladder
  - Smooth muscle, involuntary
- External urethral sphincter
  - Provides voluntary control over voiding of urine

# URINE ELIMINATION

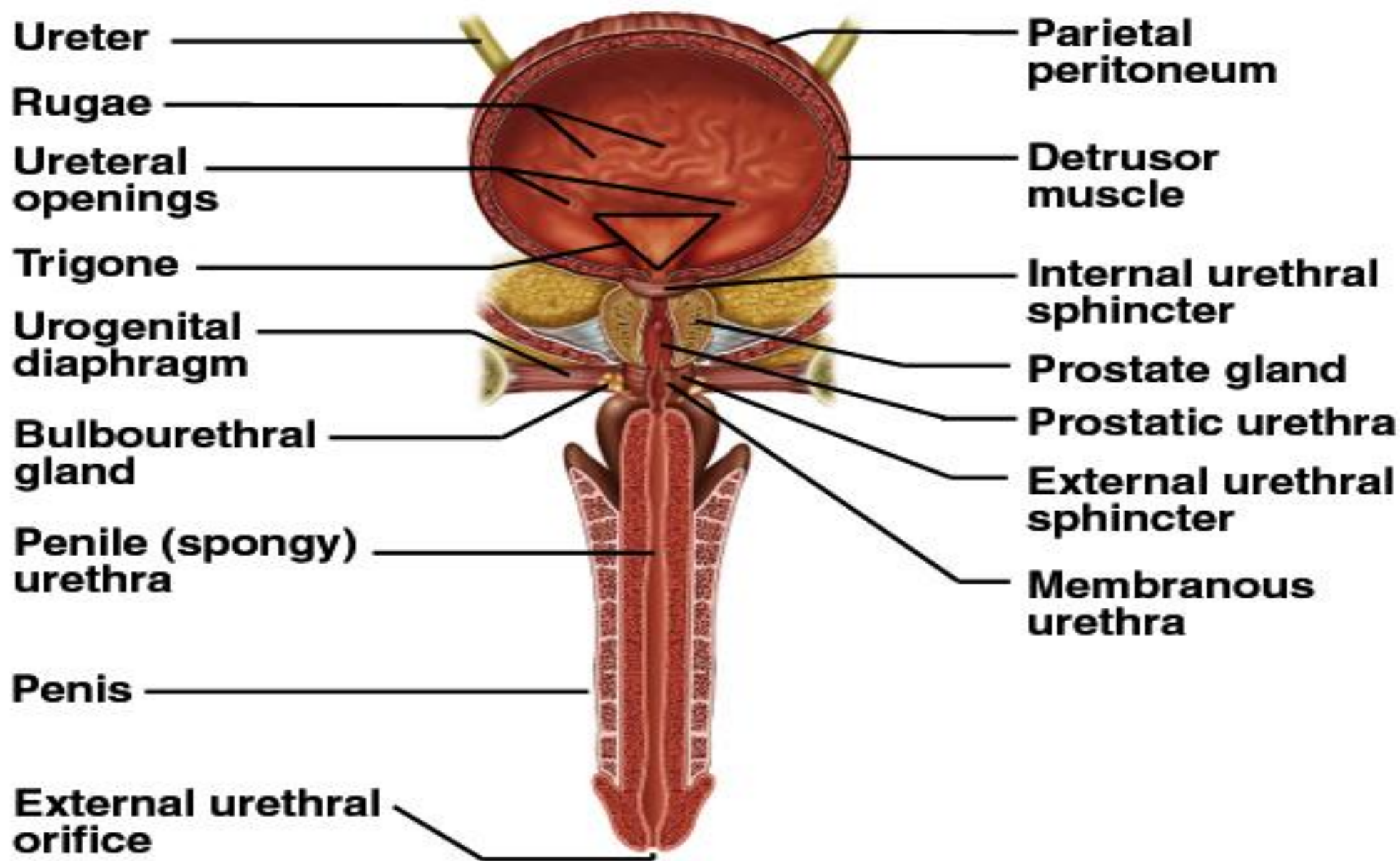
## Urethra

- 3 – 4 cm long in females
- 18 cm long in males

# Urinary Bladder and Urethra, Female



# Urinary Bladder and Urethra, Male



THANK YOU